

**FCC ADVISORY COMMITTEE
ON ADVANCED TELEVISION SERVICE**

SYSTEMS SUBCOMMITTEE

THIRD INTERIM REPORT

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**FCC ADVISORY COMMITTEE
ON ADVANCED TELEVISION SERVICE**

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FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE**SYSTEMS SUBCOMMITTEE****THIRD INTERIM REPORT****1.0. Introduction****1.1. Charter and Organization**

In the Charter of the Advisory Committee on Advanced Television Service, the FCC assigned the Systems Subcommittee (SS) the objective to specify the transmission/reception facilities appropriate for providing advanced television (ATV) service in the United States. The scope of this function, as specified on page 2 of the Charter, includes the following activities:

"(a) Evaluate, on technical and economic bases, advanced television systems now under development for the purpose of determining feasibility for implementation in the United States;

"(b) Recommend advanced television system(s) now under development as candidate(s) for implementation, or specify the design of an appropriate system.

"(c) Advise on the appropriate transmission/reception technical standards and spectrum requirements for the recommended system(s)."

In brief, the Systems Subcommittee is to apply the guidance of the Planning Subcommittee (PS) to the technical analysis, testing, and economic analysis of various ATV system proposals, and develop a recommendation for the optimal ATV standard(s) for the United States. The recommendations of the Systems Subcommittee will be used both by the full Advisory Committee in its advice to the FCC, and by the Implementation Subcommittee (IS) in its identification of regulatory and policy issues and the development of a transition scenario to introduce ATV service.

The Subcommittee's organization includes Irwin Dorros (Bellcore) as Chair, and John Abel (National Association of Broadcasters) and Tyrone Brown (Steptoe and Johnson) as Vice Chairs.

The substantive work of the Subcommittee has been divided into four Working Parties: (1) Systems Analysis; (2) System Evaluation and Testing; (3) Economic Assessment; and (4) System Standards. The Systems Subcommittee organization chart is included as Attachment A, which provides the names and affiliations of each of the officers. Attachment B provides a listing of the meetings to date of the full Subcommittee.

The functions of each Working Party (WP) are briefly described below, and summaries of their progress are provided in later sections of this report. Detailed reports from each of the Working Parties are included as Attachments D through G. The *Sequence & Pro Forma Calendar* issued by the Advisory Committee, in cooperation with the Advanced Television Test Center (ATTC) and the Cable Laboratories (Cable Labs) is Attachment H.

Each Working Party has a Chair and three Vice Chairs, selected for their expertise as well as to provide balanced industry representation. Membership in the Working Parties is open to the public. All Subcommittee and full Working Party meetings are conducted in an open forum.

SS/WP1 (Systems Analysis) is charged with collecting information from ATV proponents, technically analyzing that information, and recommending which systems should proceed to the testing stage (SS/WP2). Analysis of ATV systems is to be done in accordance with the guidance provided by the Planning Subcommittee, in particular, PS/WP1 (ATV Attributes).

SS/WP2 (System Evaluation and Testing) is charged with carrying out the appropriate objective and subjective testing of systems that have passed through the SS/WP1 screening program. Technical and procedural guidance are provided by several Working Parties in the Planning Subcommittee, particularly PS WP2 (Testing and Evaluation Specifications) whose output is expected to incorporate the decisions of PS WP1 (ATV Attributes), PS WP4 (Alternative Media), and PS WP6 (Subjective Assessment). The results of the SS/WP2 testing program will be key inputs to the SS/WP4 work on recommending the optimal ATV standard(s).

SS/WP3 (Economic Assessment) is charged with estimating the costs associated with each of the ATV systems. Guidance is to be provided by PS WP5 (Economic Factors and Market Penetration). The economic analyses produced by SS/WP3 will be used in the deliberations of SS/WP4.

SS/WP4 (System Standards) is charged with recommending the ATV transmission standard(s) for the United States. As indicated above, key inputs will come from the other three SS Working Parties. In addition, SS/WP4 will consider the guidance and information provided by the Planning Subcommittee's Working Parties, as well as its advisory groups on creative issues and consumer/trade issues. The recommendations of SS/WP4 will be used by the Advisory Committee in its advice to the FCC and by the Implementation Subcommittee in developing a plan for introducing ATV in the United States.

1.2. The Decision-Making Process

This discussion of the decision making process was first introduced in the Second Interim Report, issued April 1989. It bears repeating here, since this process provides both the backbone and the context for the work of the Systems Subcommittee.

The decision-making approach used by the Systems Subcommittee and its Working Parties, consistent with the guidance of the Advisory Committee Chair, is to work toward group consensus. We realize that some issues may be contested and consensus may be difficult to reach at times. Voting has been suggested as an alternative to resolve difficult issues. It is important, however, that the Subcommittee's recommendations have the overall support of the industry, and the best way to achieve that result is to forge a consensus.

Clearly, there may be issues on which a minority view (or views) may persist. The Subcommittee has decided to handle those issues in the following manner: the officers of a particular group (Subcommittee or any of its WPs) will make a determination of the general consensus on each issue, and reflect that in their draft report; then, members of the group will be provided with an opportunity to review the report, the group's officers will respond to the comments, and those members with residual minority views may submit their views, in writing, to be appended to the group's final report.

Some participants may view the development of a recommended standard as a "horse race" among the various proponents' systems, with a single winner and the rest losers. The Subcommittee does not share that view. Our objective is to examine the technical and economic characteristics of the various ATV system proposals and achieve industry consensus on the optimal ATV standard for the United States -- one that could be in use for the next forty years. Recognizing the importance of the recommended standard, the Subcommittee sees a need to conduct extensive objective and subjective tests of the proposed systems, as well as field tests, before a recommendation is reached. We also recognize, however, a need to reach a timely decision in order for the FCC and the industry to move forward with ATV implementation. Thus, we are exploring means to expedite the testing process without sacrificing the necessary depth.

The ATV transmission standard to be recommended by the Subcommittee may relate entirely to one of the system proposals submitted, or it may be some synthesis of the best features of several proposals. Such a synthesis may result from the deliberations of SS/WP4 or, ideally, from the proponents themselves. Industry agreement on a standard, prior to the Advisory Committee recommendation to the FCC, will speed the eventual introduction of ATV in the United States.

1.3. Key Decisions

While most of the substantive work of the Systems Subcommittee is carried out in the Working Parties, a few important decisions over the last year have been made at the Subcommittee level.

At the sixth meeting of the Systems Subcommittee, held 31 May 1989 in New York City, the members agreed, with only one dissenter, that it would not be appropriate for the Advisory Committee to establish minimum performance criteria for the ATV systems.

The question of whether the full motion test material (produced for use in the subjective assessment tests) should be released to the ATV system proponents in advance of the testing program was thoroughly discussed at the eighth meeting of the SS, held on 28 November in Washington DC. The members agreed, by an overwhelming consensus, the proponents *should* be entitled to have some of the unedited raw footage (but *not* the final test sequences) to use in their own development programs.

Most recently, at the ninth meeting, held on 27 February in Washington, DC, the SS agreed to recommend that the Advisory Committee reconsider its decision to accept ATV systems for testing without a fully functioning audio subsystem. Consensus was reached that only complete *television* (video and audio) systems would be accepted for testing, even during the initial round. This is a departure from the previous recommendation that systems could be accepted for initial testing with one or more data channels present, but no functioning audio subsystem. Dr. Dorros accepted the group's decision at the meeting, but reminded the members that the matter might be brought up again for discussion at Mr. Wiley's meeting with the proponents in April 1990.

The next four sections will review individual progress and developments in each of the Working Parties within the Systems Subcommittee.

2.0. Systems Analysis - Working Party 1

2.1. Charter and Organization

Systems Subcommittee Working Party 1 (SS/WP1) has the responsibility to analyze the various systems proposed for the distribution of ATV, determine the technical viability of each, and if appropriate, certify them for testing by Systems Subcommittee Working Party 2. SS/WP1 is guided in its work by the attributes developed by the Planning Subcommittee.

The Chair of SS/WP1 is Mr. Birney Dayton of NVision. He is assisted by three Vice-Chairs: Mr. Carl Eilers of Zenith, Mr. David Kettler of BellSouth Services, and Mr. John Swanson of Cox Broadcasting. The Secretary for the group is Mr. Bill Gaylord of BellSouth Services.

2.2. Summary of Progress to Date

Systems Subcommittee Working Party 1 held a meeting most recently on 24 January 1990 in Orlando, Florida. The information given below on the status of the ATV system proponents and their submissions is accurate as of that meeting.

2.2.1. Status of Proponents

The Second Interim Report, issued April 1989, described proposals for advanced television systems, or parts of systems, that had been submitted by seventeen companies. On 9 June 1989, a letter was written by Irwin Dorros, Chair of the Systems Subcommittee, to each of these seventeen companies asking when it planned to deliver a complete system for testing by System Subcommittee Working Party 2.

Eight companies, Faroudja Laboratories, Production Services, the David Sarnoff Research Center, NHK, North American Philips, the New York Institute of Technology, MIT, and Zenith replied that they planned to deliver a total of eleven complete systems for laboratory testing. (One each, except NHK planned to deliver three systems at that time: MUSE-E, MUSE-6 and Narrow MUSE, and Sarnoff two: ACTV I & II.) These eight companies were invited to a meeting to be hosted by Mr. Wiley on 28 September 1989, at the FCC's offices in Washington, DC. The purpose of the meeting was to finalize a testing schedule for these eleven systems, to discuss any concerns about the testing process, and to give the testing laboratories (ATTC and Cable Labs) an opportunity to discuss their fee structure.

Subsequently, the number of systems was reduced to ten when NHK decided to withdraw MUSE-E from consideration, and the number of proponents was reduced to seven when NYIT revealed, in a letter to Irwin Dorros dated 29 August 1989, that it did not have the resources necessary to complete the development of its system.

Chairman Wiley and the remaining seven companies jointly developed a *Sequence & Pro Forma Calendar* at the 28 September meeting, known appropriately enough as the Test Scheduling and Planning Meeting. The schedule, included with this Report as Attachment H, depicts nine "access periods" or "slots", each of six weeks duration, reserved by seven companies.

On 25 January 1990, one day after the last meeting of SS/WP1, Philips Consumer Electronics Company, NBC, Thompson Consumer Electronics and the David Sarnoff Research Center jointly announced the formation of the Advanced Television Research Consortium (ATRC). The press release indicates that the ATRC will jointly promote ACTV (formerly ACTV-I) as a compatible widescreen EDTV upgrade of the present NTSC service for transmission terrestrially and on cable systems. In parallel, the consortium will develop a higher quality simulcast system intended for delivery over separate channels.

In addition to the seven companies currently holding reservations for test slots, three other organizations have expressed a desire to submit a system for testing. The three, New York Institute of Technology, Carole Broadcasting, and Ear Three Systems Manufacturing Company have been asked to submit detailed system descriptions for the consideration of the Working Party. If the proposals are approved by SS/WP1, it will grant preliminary certification to these companies. These systems will only be tested, however, based upon the conditions outlined in Section 3.2.3.

2.2.2. Certification of Systems

SS/WP1 is empowered by its charter to certify systems for hardware testing by SS/WP2. The criteria to be used for, and the timing of, this certification have been the subject of lively debate in both the Working Party and the Systems Subcommittee for several months.

The Advisory Committee and the Advanced Television Test Center would like the systems to be certified as early as possible, to facilitate planning and to be sure that the correct equipment is being purchased by the laboratory. On the other hand, these systems are still in a state of prototypical development. Most are changing so rapidly that the proponents can only give the Committee a vague idea of the final technical details.

A compromise was finally reached: certification would be accomplished in two stages. The systems would be reviewed as quickly as possible and, if warranted, given preliminary certification based on the limited technical detail available. No judgment of the technical merits of the systems would be made during this preliminary certification period. The review would consist of an overview analysis to be sure the system seems technically reasonable, combined with a judgment by SS/WP1 that the proponent will actually develop hardware for testing. A second, rigorous review will take place ninety (90) days before a particular system is scheduled for testing, at which time all the salient details of the system operation will be known.

Six systems were granted preliminary certification by SS/WP1 at its meeting on 24 January 1990. These six are: ACTV I and II submitted by the David Sarnoff Research Center, HDS NA-6 (an analog, simulcast system) submitted by North American Philips, MUSE 6 and Narrow MUSE submitted by NHK, and SC-HDTV submitted by Zenith. The proponents of all six of these systems currently hold reserved test slots on the ATTC schedule, Attachment H. The offerings of three other companies which have also reserved slots, Genesys submitted by Production Services, SuperNTSC submitted by Faroudja Laboratories, and an MIT channel compatible system have not yet been pre-certified, mostly because they are thus far incompletely documented.

Completing the certification procedure and finalizing the number of systems which will have to be tested is a critical item for the testing laboratories, and for the Committee. The Committee, without resources of its own, must rely on the testing laboratories sponsored by industry to successfully complete its work. These organizations, while exceedingly generous, do not themselves have unlimited resources. These resources must be used as efficiently as possible.

As noted above, three companies which currently have reserved test slots, Faroudja Laboratories, MIT, and Production Services have not yet been certified by SS/WP1 for testing. These companies will be given until 1 June 1990 to supply enough information to complete the pre-certification process. SS/WP1 may not feel it can grant pre-certification based solely on the written system description. In that case, a proponent company will have the option of inviting a group of experts from the Working Party to travel to its premises to see its system in operation. Each company will therefore have at least two different ways to convince SS/WP1 of the viability of its design. However, if any of these systems is still

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2.2. Summary of Progress to Date

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- (4) Supervise the actual testing process;
- (5) Analyze the test data and present results to SS/WP4.

Until the start of actual testing, some months from now, no substantive work will begin on the fourth and fifth items on the list. However, since the Second Interim Report was issued last April, much progress has been made toward completing the first three tasks. The next sections will review specific developments in each of these areas.

3.2.1. Test Facilities and Equipment

The Advanced Television Test Center (ATTC) has moved into its permanent location in Alexandria, VA, where the physical construction of its facilities is close to completion. The next phase of the construction, wiring and equipment installation, will begin during the week of 13 February. Completion of this work is anticipated by the end of March.

An agreement has been reached between the ATTC and the Cable Television Laboratories to jointly conduct objective and transmission tests at the facilities of the ATTC, covering transmission of an ATV signal via terrestrial broadcast, coaxial cable and optical fiber. The Canadian Communications Research Centre (CRC) has graciously offered to participate in the work of the Advisory Committee by conducting a portion of the subjective tests in its facilities in Ottawa. Negotiations are presently underway to finalize the respective roles of our two countries and commitment of the resources necessary to carry out this work.

ATTC reports that it has purchased, or contracted for the construction of, most of the major pieces of equipment needed to implement the test procedures for objective and terrestrial broadcast measurements. Two Sony high definition digital video tape recorders (HDD-1000) and the digital still store and image processor (Pixar) have already been received and are undergoing testing. A digital format converter, designed by the ATTC staff to permit recording and subsequently playing several video formats for which the HDD-1000 recorders were not specifically designed, is under construction by Tektronix. The first prototype of this machine is scheduled for acceptance testing in April 1990.

3.2.2. Test Management Plan and Test Procedures Plans

The Test Management Plan was completed by SS/WP2 and submitted to the full Advisory Committee for review and comment prior to the meeting on 19 July 1989. The substance of the Plan was approved at the meeting. Essentially complete at the time of approval, only minor modifications have been made since.

At the same 19 July meeting, the Advisory Committee approved outlines for three Test Procedures Plans, Objective and Transmission Tests, Cable Television Transmission Tests, and Subjective Tests, with the understanding that the plans themselves would be finalized later in the year. Detailed Test Procedures Plans have now been completed and circulated for review and comment. The Objective and Transmissions Test Procedures Plan and the Cable Television Transmission Test Procedures Plan were approved by the membership of SS/WP2 at their meeting on 7 February 1990. The Subjective Test Procedures Plan was

conditionally approved, subject to review and "harmonization" with the document previously developed by PS/WP6. SS/WP2 anticipates that this review and any modifications needed will be completed prior to the Systems Subcommittee meeting on 27 February, and that all three plans will be approved in their entirety at that time. After approval by the SS, the documents will be appended to this Third Interim Report and sent to the full Advisory Committee for consideration.

The Test Procedures Plans and the Test Management Plan are helping SS/WP2 and the laboratories navigate uncharted territory. The Working Party anticipates that the plans, even after approval by the Advisory Committee, will have to be modified and updated occasionally throughout the testing process as new information becomes available, and it will have to have some flexibility in this regard. The Advisory Committee recognized this reality when it authorized Chairman Wiley, at the 19 July meeting, to make minor modifications to the plans without full Committee review and approval.

3.2.3. Test Schedule

With the leadership and participation of Chairman Wiley, a *Sequence & Pro Forma Calendar* has been jointly developed by the Advisory Committee and the ATV system proponents. The present schedule, included with this Report as Attachment H, allows nine "access periods" or "slots", each of six weeks duration, for testing ATV systems, submitted by seven companies, in the period between June 1990 and September 1991. These seven companies are: Faroudja Laboratories, Production Services, the David Sarnoff Research Center, NHK, Zenith, North American Philips and MIT. Mr. Wiley has recently indicated that the start of testing may have to be postponed until the early fall of 1990 because of delays and complications associated with obtaining full motion test materials for subjective assessment of these systems.

Three proponents which do not currently have slots, the New York Institute of Technology, Carole Broadcasting, and the Ear Three Systems Manufacturing Company have indicated some desire to have a system tested.

The responsibility of the Systems Subcommittee on this matter is to adhere to the timetable mandated by the FCC. It will be a difficult, but not impossible, matter for a new system to be entered into the process at this late date. Assuming a system presented by one of these organizations is certified for testing by SS/WP1, and can use the objective and subjective test material already created, it could actually be tested only if the FCC allows more time for the work of the Advisory Committee to be completed, or if time in the present schedule becomes available as the result of a withdrawal or merger among the companies which have presently reserved slots. In addition, the system proponent would be required to pay any test fees imposed by the laboratories, and finally, the laboratories must be available to actually perform the tests.

3.3. Future Work

While much has been accomplished by SS/WP2, much remains to be done in the coming months. Several major aspects of the testing program must be finalized. Specifically, these are as follows:

(1) *"Complete" System and Audio Tests.* No procedures, either subjective or objective, have been developed to test audio subsystems of the ATV systems. Part of the reason may be attributed to a recommendation by Planning Subcommittee Working Party 2, which felt that ATV systems should be accepted for a first round of tests without requiring that a fully developed audio subsystem be available. Instead, it would be acceptable to test the audio channel, or channels, of a system by loading the channel with pseudo-random data and examining the resultant bit error rate and its impact on the video signal quality. This was a compromise forged to balance the need of the Advisory Committee begin the testing program with the need of the system designers to have adequate time to develop their systems. However, since the time of that recommendation, the start of testing has been delayed, by other unrelated factors, for more than a year. It is now appropriate to reexamine whether this policy makes sense in light of the implied requirement to test each system "in its entirety" twice. In any event, whether audio test procedures are needed sooner or later, they will eventually be needed and must be developed.

(2) *Retesting.* Even if every system is complete with fully functional audio channels at the time of its initial testing, it is likely that some (or perhaps all) systems will still have to be retested. More than a year will pass between the time testing begins on the first system and finishes on the last. Some proponents will no doubt make modifications to their system during this time, either to correct deficiencies identified in the initial testing, to improve the performance, or to introduce new features. As the test schedule now stands, there is no time allotted and no resources identified to accommodate a second round of tests.

(3) *Field Tests.* Another very important part of the testing program has not yet been developed, namely the field tests. Not only must technical procedures be written for these tests, but resources must be found to conduct them. This is a much more complicated matter than might be apparent to the casual observer. Field testing implies not only that transmitters are available which can broadcast the signal format under test (and these will take some time to develop), but also that a large number of receivers will be available.

No manufacturers for this equipment have yet been identified. Furthermore, for the tests to be meaningful, the transmissions must take place over a long period of time (compared to the laboratory tests), under various conditions of climate and terrain. No time is allocated in the present testing schedule for these experiments.

Finally, *a lot* of program material must be available for distribution to the general public. Many hours, certainly. The Advisory Committee is having difficulty finding the resources to produce the full motion material needed for subjective assessment, material which needs to be only several *seconds* long. In effect, another whole testing program must be developed.

The difficulty in doing so should not be underestimated. SS/WP2 has taken a first step in this direction by forming a new Task Force at its last meeting to address the issues associated with conducting the field tests. This group is chaired by Mark Richer of PBS.

(4) *Subjective Tests.* Several aspects of the subjective testing program must also be completed. As noted above, the Canadian Communications Research Centre has offered to conduct some of the subjective tests in their facilities. Details of how this might be accomplished, which specific tests will be done, how the Advisory Committee will oversee the program and validate the results, and how much money each organization will contribute to the effort have yet to be finalized.

Lastly, the production of full motion test material for subjective assessment continues to be a pacing item for the testing schedule. As of this writing, no definitive completion date has been promised by Planning Subcommittee Working Party 6, the group responsible for the creation of the material. Furthermore, the group reports a serious shortfall in the funds needed to produce the footage. This is not directly an issue to be resolved by SS/WP2, but the outcome of the issue could certainly effect the ability of SS/WP2 to conduct the subjective tests.

On a related matter, the full motion test materials must be made available under conditions that do not restrict the Advisory Committee or the laboratories from actually conducting the tests. Those who own or control the rights to these test materials must license them for all legitimate uses by the Committee, its sub-groups, and the laboratories. This should include not only all activities directly related to the subjective testing of systems, but should also include public displays and demonstrations intended to inform the industry or the general public of the Committee's work.

(5) *Prioritization of Tests.* The full scope of the testing program, and the enormous resources necessary to carry out all the tests, is becoming apparent now that the Test Procedures Plans have been completed. Part of SS/WP2's responsibility is to efficiently use the resources of the industry sponsored laboratories. Therefore, the Working Party will begin examining the Test Procedures Plans to determine how many of the tests are absolutely needed. Perhaps some of the experiments can be eliminated or scaled back, in the interests of economy and to accelerate the work program, without sacrificing any important information. If it turns out that all the specified tests must be done, it may also be necessary to locate additional resources to execute the program. The laboratories will be reviewing the Procedures Plans to determine if they can undertake the full program.

4.0. Economic Assessment - Working Party 3

4.1. Charter and Organization

The charter of Systems Subcommittee Working Party 3 (SS/WP3), calls for the establishment of costs associated with the distribution of advanced television and for an assessment of the economic and technological feasibility of each of the systems proposed for transmission of an ATV service.

The Chair of SS/WP3 is Mr. Larry Thorpe of Sony Advanced Systems. He is assisted by three Vice-Chairs: Ms. Shellie Rosser of Anixter Corporation, Mr. Bill Loveless of the Bonneville International Corporation and Mr. Richard Grefe of the National Association of Public Television Stations.

4.2. Summary of Progress to Date

SS/WP3 has held a total of seventeen meetings to date, most recently on 7 December 1989. Seven of those meetings have been held since the Second Interim Report was issued last April, including one joint meeting with Planning Subcommittee Working Party 5, the Working Party on Economic Factors and Market penetration, held on 30 October 1989.

Prior to the issuance of the Second Interim Report, most of the efforts of the Working Party were devoted to developing detailed economic models and spreadsheets for program production facilities for each of the primary distribution media, and the ATV receiver. Details of these models formed the bulk of the last report. Since that time, mostly as a result of the lack of detailed technical information available from the system proponents, SS/WP3 has decided to adopt a broader view and begin a comprehensive study of the total ATV distribution infrastructure. Following the spirit of the Advisory Committee charter, the Working Party will place particular emphasis, at least in the near term, on the terrestrial broadcast network system. Other systems, such as the satellite feeder system and cable systems, will be examined from the viewpoint of their interface with the broadcast network system.

The Working Party has established six Specialist Groups, each responsible for examining a different industry segment: Terrestrial Broadcast, Cable, Satellite, Telco, Receiver/VCR, and Production. The receiver/VCR studies will be conducted by a specialist panel within EIA. This panel will initially consider the impact of various systems on receiver design and complexity. The charge of each Specialist Group is to develop detailed block diagrams needed to assess the impact of four particular ATV transmission systems on that industry segment. The four systems, ACTV from Sarnoff/NBC (a single channel, receiver compatible system), HDS-NA from Philips Laboratories (a dual channel, augmentation system), Narrow MUSE from NHK (a dual channel, simulcast system), and Spectrum Compatible HDTV from Zenith (a simulcast, channel compatible system), were chosen, based upon recommendations from SS/WP1, because they represent the major classes of solutions identified for the terrestrial transmission problem.

4.3. Future Work

SS/WP3 will continue to develop and refine its system block diagrams and spreadsheets as more complete information becomes available from the ATV system proponents.

On 30 October 1989, a valuable joint meeting was held with PS/WP5, the Working Party on Economic Factors and Market Penetration, to review the macroeconomic aspects of the assessment work being done by SS/WP3. Many broad issues were discussed, including a re-examination of the receiver penetration scenario projected by PS/WP5. Other collective meetings will be held in 1990 to continue and expand this relationship.

The membership of the Working Party feels it is now time to solicit the support and guidance of Implementation Subcommittee Working Party 2 (IS/WP2), the Working Party on Transition Scenarios, in developing their own models for possible evolution paths to ATV service. This liaison will be sought in 1990.

5.0. System Standards - Working Party 4

5.1. Charter and Organization

Systems Subcommittee Working Party 4 (SS/WP4), the Working Party on System Standards, has the responsibility to examine all the available data gathered or developed by other Working Parties and Advisory Groups in the Advisory Committee and, based upon that information, recommend a standard or standards for the terrestrial transmission of advanced television service. Recommendations developed by SS/WP4 will be used by the full Advisory Committee as it develops its own recommendations and advice for the FCC, and by the Implementation Subcommittee, whose charter includes the development of a transition scenario for the introduction of advanced television service in the United States.

The Chair of SS/WP4 is Dr. Robert Hopkins, Executive Director of the Advanced Television Systems Committee. He is assisted by three Vice-Chairs: Mr. Hugo Gaggioni of Sony Advanced Systems, Mr. Bruce Sidran of Bell Communications Research, and Mr. Louis Williamson of American Television and Communications. Mr. Sidran serves as Secretary for the group. The Chair and three Vice-Chairs are collectively referred to as the Officers.

5.2. Summary of Progress to Date

SS/WP4 has had four meetings to date, most recently on 27 November 1989. Approximately 60 individuals and organizations have participated in the activities of the Working Party by becoming members. On the average, about 25 people attend each of the meetings.

A large part of the discussions centered around two fundamental questions. First, how would the Working Party go about making a recommendation? Second, is the Working Party concerned with methods of delivery other than terrestrial broadcasting? No satisfactory answer has yet been found for the first question, which is still a subject of lively debate. The dialog will continue, as described in the next section, 5.3.

The second question, which is really a clarification of the role of the Working Party, was discussed in detail at the second meeting, held 11 April 1989. In the minutes of that meeting we find that agreement among the members was reached on several points:

"The primary intention of SS/WP4 is to make a recommendation for the terrestrial broadcast of ATV."

"SS/WP4 does not anticipate making recommendations for the transmission of ATV on alternative media, but does anticipate other organizations doing so. SS/WP4 will consider inputs from other organizations in its deliberations."

"The primary intention of SS/WP4 is to recommend a single standard for the terrestrial transmission of ATV."

"Whatever system is recommended for terrestrial broadcast cast must be capable of being carried by cable systems as well."

"SS/WP4 recognizes the importance of inter-operability between alternative media and terrestrial broadcast standards, and the desirability for consumer ATV receivers to accommodate alternative media inputs. However, it does not anticipate making recommendations in these areas, but does anticipate other organizations doing so. SS/WP4 will consider inputs from other organizations in its deliberations."

"SS/WP4 will not document a standard in the manner of SMPTE or EIA, rather its role is to recommend a standard documented by others."

The Working Party has also considered ATV system models at some length. The study was undertaken because the Working Party believes that it is important to have inter-operability between alternative media and broadcast standards and that it is desirable for consumer ATV receivers to have alternative media inputs. The Working Party determined that two organizations in the private sector were already involved in this area, the Advanced Television Systems Committee (ATSC), and the Electronics Industries Association (EIA). The Working Party recommended that these organizations be encouraged to develop specifications for an appropriate interface that could lead to a voluntary industry standard. SS/WP4 also suggested that liaison be maintained among the three groups to ensure consistency and that copies of all the relevant documents submitted to the Working Party be forwarded to the ATSC and the EIA.

As a result of these recommendations, the Chair of the Systems Subcommittee wrote letters to Mr. James McKinney, Chair, Advanced Television Systems Committee, and Mr. Sidney Topol, Chair, EIA Advanced TV Committees, (documents SS/220, SS/221) formally requesting the establishment of these liaisons. Working Party 4 has the responsibility for maintaining these relationships for the Systems Subcommittee.

5.3. Future Work

Since the substantive work of SS/WP4 necessarily follows that of the rest of the Systems Subcommittee and the Planning Subcommittee, it will be chiefly concerned with organizational and administrative matters for the next several meetings. In particular, development of a decision making process continues to be of paramount importance.

There is general agreement within the Working Party that a procedure would be helpful, perhaps mandatory, if a choice must be made among several ATV proposals, each of which is superior, or at least satisfactory, in some respects, but may be deficient in others. The difficulty has been that no proposed method has gained wide support. The problem is particularly difficult because the systems are being evaluated along several dimensions. On what basis does one decide if dynamic horizontal resolution is a more important technical attribute than static diagonal resolution, or if projected receiver cost should be given greater consideration than efficient spectrum utilization. As a logical next step aimed at resolving this issue, a presentation will be made at the fifth meeting on "value engineering", a procedure that has been used with success to evaluate alternatives to obtain maximum benefit in engineering programs.

Another critical item which will be considered and discussed by SS/WP4 in the coming months is its requirements for information. The Working Party will give thought to formalizing and articulating its needs to the other Working Parties supplying data to it.

Working Party 4 does not wish to change the projected date for agreement on a recommended standard for terrestrial broadcasting given in its Progress Report for the Second Interim Report (document SS/WP4-0008). In the Progress Report it was anticipated that test results from SS/WP2 would be available in early 1991 and that a final report from SS/WP4 could be completed by late 1991 or early 1992. The Working Party continues to remain optimistic that this challenging schedule can be met.

**FCC ADVISORY COMMITTEE
ON ADVANCED TELEVISION SERVICE**

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SYSTEM STANDARD**

Chairman:

Bob Hopkins (ATSC)

Vice Chairmen:

Hugo Gaggioni (Sony)
Bruce Sidman (Bellcore)
Louis Williamson (ATC)

Listing of Systems Subcommittee Meetings

<u>Date</u>	<u>Location</u>
1/25/88	Washington, DC
4/13/88	Las Vegas, NV
8/10/88	Washington, DC
10/19/88	New York, NY
2/9/89	Washington, DC
5/31/89	New York, NY
8/1/89	New York, NY
11/28/89	Washington, DC
2/27/90	Washington, DC

SS - 0000
09 Dec 87

ATV SYSTEMS SUBCOMMITTEE

Numbered Documents

<i>SS Number</i>	<i>Date</i>	<i>To/From/Subject</i>
0000		Document Index
0001	12/09/87	Brown/confirmation as SS VC
0002	12/09/87	Abel/confirmation as SS VC
0003	12/09/87	Dayton/confirmation as WP1 C
0004	12/09/87	Swanson/confirmation as WP1 VC
0005	12/09/87	Crutchfield/confirmation as WP2 C
0006	12/09/87	Ciciora/confirmation as WP2 VC
0007	12/09/87	Engel/confirmation as WP2 VC
0008	12/09/87	Thorpe/confirmation as WP3 C
0009	12/10/87	Eilers/confirmation as WP1 VC
0010	12/09/87	Loveless/confirmation as WP3 VC
0011	12/09/87	Hopkins/confirmation as WP4 C
0012	12/09/87	Niles/confirmation as WP4 VC
0013	12/09/87	Gaggioni/confirmation as WP4 VC
0014	12/29/87	SS officers/ 1/25 SS mtg
0015	01/29/88	SS officers/ 1/5 SC mtg minutes
0016	02/17/88	SS officers/Schreiber paper
0017	02/18/88	SS officers/ 1/25 SS mtg minutes
0018	02/22/88	SS officers/2nd draft oper. proc.
0019	02/29/88	SS officers/ 4/13 SS mtg
0020	03/15/88	Hassinger/SS directory of officers
0021	03/16/88	SS officers/note re 3/10 SC mtg
0022	03/17/88	Kettler/confirmation as WP1 VC
0023	03/17/88	Tingley/confirmation as WP2 VC
0024	03/17/88	Rosser/confirmation as WP3 VC
0025	03/17/88	Grefe/confirmation as WP3 VC
0026	03/17/88	Sidran/confirmation as WP4 VC
0027	03/17/88	Williamson/confirmation as WP4 VC
0028	03/31/88	Schreiber(MIT)/invite participation
0029	03/31/88	Lippel(Quanticon)/invite participation
0030	03/31/88	Toth(Philips)/invite participation
0031	03/31/88	Lager(A-Vision)/invite participation
0032	03/31/88	Osborne/invite participation
0033	03/31/88	Iredale(Del Rey)/invite participation

0034	03/31/88	Fuhrer(Sarnoff)/invite participation
0035	03/31/88	Rzeszewski(AT&T)/invite participation
0036	03/31/88	Glenn(NYTT)/invite participation
0037	03/31/88	Sugimoto(NHK)/invite participation
0038	03/31/88	Faroudja/invite participation
0039	03/31/88	Lucas(SciAtl)/invite participation
0040	03/31/88	Annegarn(Philips-Eindhoven)/invite participation
0041	03/31/88	Hagemann(BTA-Japan)/invite participation
0042	04/15/88	Gerde/ 6/3 AC mtg(PSI)/invite participation
0043	04/15/88	Wiley/
0044	04/29/88	4/13 SS meeting minutes
0045	05/02/88	SS officers/Glenn submission
0046	05/02/88	SS officers/ 3/10 SC minutes
0047	05/12/88	Conner(Digideck)/invite participation
0048	05/12/88	Seigel/invite participation
0049	05/12/88	Bingham/IS WP2 distributions
0050	05/20/88	Crutchfield/WP2 activities
0051	05/23/88	SS officers/draft report
0052	05/24/88	Dayton/Faroudja submission
0053	05/25/88	Dayton/Osborne submission
0054	05/27/88	Wiley/comments on draft report
0055	05/31/88	Dayton/Digideck submission
0056	06/02/88	Dayton/Zenith,NHK,BTA submissions
0057	06/02/88	Glenn/response to 5/17 ltr re FIR filter
0058	06/06/88	SS officers/ 6/24 conf call
0059	06/07/88	Dayton/Philips submission
0060	06/22/88	Crutchfield/Hubbard offer re testing
0061	06/22/88	Hubbard/response to his letter
0062	06/24/88	SS officers/final version Interim Report
0063	07/05/88	SS officers/ 6/24 conf call minutes
0064	07/13/88	SS officers/ 8/10 mtg notice
0065	07/13/88	SS officers/14 comments on Interim Report
0066	07/13/88	Iredale/WP mtg coordination
0067	08/04/88	WP chairs/Sawchuck mtg on 8/10
0068	08/08/88	WP chairs/PS work descr. review
0069	08/11/88	SS officers/OA receivers
0070	08/16/88	SS officers/corr. to 0069
0071	08/22/88	Wiley/Thorpe req. for funds
0072	08/23/88	Tietjen/coord. proponent contacts
0073	08/26/88	8/10 SS meeting minutes
0074	08/29/88	SS officers/Sawchuck mtg
0075	09/01/88	SS officers/doc distr & preview
0076	09/18/88	Flaherty/Inputs from PS
0077	09/20/88	SS officers/10/19 mtg notice

0078	10/11/88	Dayton/treatment of systems proponents
0079	10/21/88	Flaherty/comments on PS work plan
0080	10/31/88	10/19 SS meeting minutes
0081	10/31/88	SS officers/Second Interim Report
0082	11/28/88	Wiley/Reimbursement request for B. Jones
0083	12/01/88	SS officers/Work statements for PS and its WPs
0084	12/05/88	SS officers/Endorsements of 1125/60 standard
0085	12/09/88	SS officers/2/9 mtg notice
0086	12/09/88	SS officers/Second Interim Report
0087	12/09/88	SS officers/Items of interest from D. Wiley
0088	12/20/88	SS officers/Second Interim Report
0089	01/04/89	R. Ducey/PS WP7
0090	02/01/89	P. Fannon/ATTC
0091	02/03/89	P. Fannon/ATTC Testing procedures and key issues
0092	02/03/89	SS officers/HDTV article
0095	02/27/89	2/9 SS mtg minutes
0096	03/08/89	Wiley/SS Interim Report
0097	03/08/89	R. Iredale/Del Rey Proposal
0098	03/13/89	Wiley/Draft Second Interim Report
0099	03/14/89	SS officers/Draft Second Interim Report
0100		Not issued
0101	03/30/89	Flaherty/Test Plans
0102	04/07/89	Wiley/March 31 Draft Second Interim Report
0103	04/07/89	R. Rau/Comments on Second Interim Report
0104	04/07/89	W. Schreiber/Comments on Second Interim Report
0105	04/07/89	G. Robinson/Comments on Second Interim Report
0106	04/07/89	A. Toth/Comments on Second Interim Report
0107	04/07/89	T. Ohmura/Comments on Second Interim Report
0108	04/07/89	S. Bonica/Comments on Second Interim Report
0109	04/10/89	Wiley/Final Second Interim Report
0110	04/20/89	SS Members/5/31 mtg notice
0111	04/20/89	Crutchfield/Test procedure & test mgmt. plans
0112	05/05/89	Flaherty/Test parameter plans
0113	05/11/89	SS Members/Wiley's 2nd Interim Report
0114	05/15/89	R. Lehtinen/Letter from R.Iredale
0115	05/17/89	SS officers/PS activities
0116	05/18/89	Wiley/Commitments for testing
0117	06/05/89	Wiley/Zenith letter on aspect ratio
0118	06/05/89	Ciciora/Memo on HDTV/workstations
0119	06/07/89	Dayton, Thorpe, Hopkins/ATTC memo, re: 2nd marathon session
0120	06/09/89	Siegel/Hardware availability
0121	06/09/89	Ohmura/Hardware availability
0122	06/09/89	Carnes/Hardware availability

0123	06/09/89	Iredale/Hardware availability
0124	06/09/89	Faroudja/Hardware availability
0125	06/09/89	Schreiber/Hardware availability
0126	06/09/89	Glenn/Hardware availability
0127	06/09/89	Sugimoto/Hardware availability
0128	06/09/89	Marsiglio/Hardware availability
0129	06/09/89	Osborne/Hardware availability
0130	06/09/89	Gerdes/Hardware availability
0131	06/09/89	Lucas/Hardware availability
0132	06/09/89	Luplow/Hardware availability
0133	06/09/89	Lippel/Hardware availability
0134	06/09/89	Conner/Hardware availability
0135	06/09/89	Ilkovics/Hardware availability
0136	06/09/89	Forshay/Hardware availability
0137	05/31/89	Dorros/Wiley/Proponent letters
0138	06/16/89	Dorros/Iredale/Hardware availability
0139	05/22/89	Dorros/Engel/Input on ATV system model
0140	05/24/89	Dorros/Bellisio/Input on ATV system model
0141	05/18/89	Dorros/Heimbach/Input on ATV system model
0142	05/04/89	Dorros/Schreiber/Input on ATV system model
0143	05/19/89	Dorros/Rau/Input on ATV system model
0144	05/19/89	Dorros/Toth/Input on ATV system model
0145	05/31/89	Dorros/CRC/Input on ATV system model
0146	06/21/89	Dayton/Reply on hardware availability
0147	06/21/89	Hanover/Confirmation as WP2 VC
0148	06/22/89	5/31 SS Meeting Minutes
0149	06/15/89	Dorros/Wiley/Hanover nomination
0150	06/21/89	Dorros/Solomon/Hardware availability
0151	06/21/89	Dorros/Kettler/Alternative approach to ATV studies
0152	06/23/89	Dorros/Faroudja/Hardware availability
0153	06/27/89	Dorros/Luplow/Hardware availability
0154		Not issued
0155	06/28/89	Dorros/Crutchfield/WP2 status
0156	06/27/89	Dorros/Schreiber/Hardware availability
0157	06/29/89	Wiley/Test Procedures & Test Mgmt. Plans
0158	07/01/89	Dorros/Stow/Test Parameter Plan
0159	06/30/89	Dorros/Ohmura/Hardware availability
0160	06/29/89	Dorros/Forshay/Hardware availability
0161	06/27/89	Dorros/Tietjen/Hardware availability
0162	06/30/89	Dorros/Gerdes/Hardware availability
0163	06/30/89	Dorros/Tsinberg/Hardware availability
0164	06/30/89	Dorros/Sugimoto/Hardware availability
0165	07/03/89	Dorros/Dayton/WP1 status
0166	07/05/89	Wiley, Fannon, Green/Dorros/Proponent responses

0167	07/13/89	SS Officers, Members/Dorros/8/1 Meeting Notice
0168	07/12/89	Dorros/Faroudja/Hardware availability
0169	07/18/89	Wiley/Dorros/Letter to remaining proponents
0170	07/11/89	Dorros/Conner/Hardware availability
0171	07/20/89	Beasley/Dorros/Response to "Notes on HDTV"
0172	07/14/89	Dorros/Seigle/Hardware availability
0173	07/11/89	WP3 Meeting Minutes
0174	07/12/89	WP4 ATV Systems Models
0175	07/26/89	Dayton/Dorros/Certification of ATV systems
0176	07/25/89	Dorros/Sie/Advisory Committee
0177	07/25/89	Status of Proponent Hardware Availability
0178	08/04/89	Seigel/Dorros/Removal from prop.list
0179	08/04/89	Ohmura/Dorros/Removal from prop.list
0180	08/04/89	Iredale/Dorros/Removal from prop.list
0181	08/04/89	Conner/Dorros/Removal from prop.list
0182	08/04/89	Lucas/Dorros/Removal from prop.list
0183	08/04/89	Forshay/Dorros/Removal from prop.list
0184	08/04/89	Ilkovics/Dorros/Removal from prop.list
0185	08/04/89	Osborne/Dorros/Removal from prop.list
0186	08/04/89	Lippel/Dorros/Removal from prop.list
0187		Not issued
0188	08/11/89	Tietjen/Dorros/Info for ATTC
0189	08/11/89	Faroudja/Dorros/Info for ATTC
0190	08/11/89	Schreiber/Dorros/Info for ATTC
0191	08/11/89	Solomon/Dorros/Info for ATTC
0192	08/11/89	Sugimoto/Dorros/Info for ATTC
0193	08/11/89	Toth/Dorros/Info for ATTC
0194	08/11/89	Gerdes/Dorros/Info for ATTC
0195	08/11/89	Luplow/Dorros/Info for ATTC
0196	08/11/89	Sie/Dorros/
0197	08/11/89	Dorros/Iredale/Removal from proponent list
0198	08/16/89	Dorros/Ohmura/Removal from proponent list
0199	08/22/89	8/1 SS Meeting Minutes
0200	08/25/89	Iredale/Dorros/Proponent status
0201	08/25/89	Schine/Dorros/HRS Testing Participation
0202	08/29/89	Dorros/Robinson/Hardware Availability
0203	08/25/89	Dorros/Cavallerano/Info for 09/28/89 Meeting
0204	08/29/89	Dorros/Solomon/Testing
0205	09/01/89	Dorros/Sawchuk/Recommendation of CABSC
0206	09/15/89	Dorros/Gerdes/Response to 8/11
0207	09/14/89	Dorros/Luplow/Response to 8/11
0208	09/14/89	Dorros/Rosner/Response to 8/11
0209	09/13/89	Dorros/Tietja/Response to 8/11
0210	09/12/89	Dorros/Iredale/Response to 8/25

0211	09/22/89	Dorros/Schine/Wiley Meeting
0212	10/04/89	Dayton/Dorros/Flowchart for System Certification
0213	10/06/89	Luplow/Dorros/Clarification of Testing Process
0214	10/04/89	Dorros/Sugimoto
0215	11/03/89	Schine/Dorros/Availability of Testing Time
0216	10/20/89	Dayton, Crutchfield, Hopkins, Thorpe/Dorros/ Zenith's request to keep issue of aspect ratio and final decision by FCC open
0217	10/31/89	SS Members/Dorros/11/28 SS mtg
0218	11/07/89	Dorros/Luplow/Response to 10/6 Letter
0219	11/08/89	Dorros/Sikes/Continue to serve on AC
0220	12/04/89	Topol/Dorros/Transmittal of WP4 documents
0221	12/04/89	McKinney/Dorros/Transmittal of WP4 documents
0222	12/08/89	Meeting Minutes from 11/28
0223	12/18/89	Luplow/Dorros/Format for 12/31 system descrip.
0224	12/22/89	Dorros/Topol/Development of multiport receiver interface
0225	12/21/89	Dorros/Felker/ATV system submission
0226	12/27/89	Dayton/Dorros/Transmittal letter for 0225
0227	1/26/90	Wiley/Dorros/SS Statement on release of subjective test material to ATV system proponents
0228	1/25/90	SS/Dorros/Feb. 27 mtg. notice and agenda
0229	1/11/90	SS/WP4 Progress Report
0230	2/13/90	SS/Dorros/Third Interim Report & Wiley Package